

WHAT IS CLAIMED IS:

- 1 1. A method for smoothing, comprising:
2 loading, in a data processing system, a model having
3 at least one node;
4 receiving a selection of a node of the model;
5 determining a nodal valency of the node;
6 determining an element connectivity pattern of the
7 node;
8 performing a smoothing operation on the node according
9 to the nodal valency and the element connectivity
10 pattern; and
11 storing the model.

- 1 2. The method of claim 1, wherein
2 if the element connectivity pattern is a triangle,
3 then incenter-based smoothing is performed;
4 if the element connectivity pattern is a quad-only
5 mesh, then isoparametric-Laplace smoothing is
6 performed;
7 if the element connectivity pattern is a mapped
8 region, then equipotential smoothing is
9 performed; and
10 if the element connectivity pattern is a free-mixed
11 mesh, then combined incenter and laplacian
12 smoothing is performed.

1 3. The method of claim 1, wherein the smoothing of the
2 node is performed using

$$\begin{array}{l} 3 \qquad \qquad \qquad N \\ 4 \qquad \qquad \qquad P_i' = \sum_{n=1}^N F_n(C,V) * \Omega_n(C,V) \\ 5 \qquad \qquad \qquad n = 1 \end{array}$$

6 and wherein i is the node to be smoothed, i is
7 connected to N elements, P_i' is the new position of
8 node i, F_n is the variational weight factor for n-th
9 element Ω_n is the positional function for n-th
10 element, C denotes the connectivity pattern of the
11 node, and V indicates the valency of the node.

1 4. The method of claim 1, further comprising performing
2 an interior angle screening process.

1 5. The method of claim 1, further comprising constraining
2 the node within a predetermined tolerance.

1 6. A data processing system having at least a processor
2 an accessible memory, comprising:
3 means for loading a model having at least one node;
4 means for receiving a selection of a node of the
5 graphic model;
6 means for determining a nodal valency of the node;
7 means for determining an element connectivity pattern
8 of the node;
9 means for performing a smoothing operation on the node
10 according to the nodal valency and the element
11 connectivity pattern; and
12 means for storing the model.

1 7. The data processing system of claim 6, wherein
2 if the element connectivity pattern is a triangle,
3 then incenter-based smoothing is performed;
4 if the element connectivity pattern is a quad-only
5 mesh, then isoparametric-Laplace smoothing is
6 performed;
7 if the element connectivity pattern is a mapped
8 region, then equipotential smoothing is
9 performed; and
10 if the element connectivity pattern is a free-mixed
11 mesh, then combined incenter and laplacian
12 smoothing is performed.

1 8. The data processing system of claim 6, wherein the
2 smoothing of the node is performed using

$$\begin{array}{l} 3 \quad \quad \quad N \\ 4 \quad \quad \quad P_i' = \sum_{n=1}^N F_n(C,V) * \Omega_n(C,V) \\ 5 \quad \quad \quad n = 1 \end{array}$$

6 and wherein i is the node to be smoothed, i is
7 connected to N elements, P_i' is the new position of
8 node i, F_n is the variational weight factor for n-th
9 element Ω_n is the positional function for n-th
10 element, C denotes the connectivity pattern of the
11 node, and V indicates the valency of the node.

1 9. The data processing system of claim 6, further
2 comprising means for performing an interior angle
3 screening process.

1 10. The data processing system of claim 6, further
2 comprising means for constraining the node within a
3 predetermined tolerance.

1 11. A computer program product tangibly embodied in a
2 machine-readable medium, comprising:
3 instructions for loading, in a data processing system,
4 a model having at least one node;
5 instructions for receiving a selection of a node of
6 the graphic model;
7 instructions for determining a nodal valency of the
8 node;
9 instructions for determining an element connectivity
10 pattern of the node;
11 instructions for performing a smoothing operation on
12 the node according to the nodal valency and the
13 element connectivity pattern; and
14 instructions for storing the model.

1 12. The computer program product of claim 11, wherein
2 if the element connectivity pattern is a triangle,
3 then incenter-based smoothing is performed;
4 if the element connectivity pattern is a quad-only
5 mesh, then isoparametric-Laplace smoothing is
6 performed;
7 if the element connectivity pattern is a mapped
8 region, then equipotential smoothing is
9 performed; and
10 if the element connectivity pattern is a free-mixed
11 mesh, then combined incenter and laplacian
12 smoothing is performed.

1 13. The computer program product of claim 11, wherein the
2 smoothing of the node is performed according using

$$\begin{aligned} & \text{3} \quad \quad \quad N \\ & \text{4} \quad \quad \quad P_i' = \sum_{n=1}^N F_n(C,V) * \Omega_n(C,V) \\ & \text{5} \quad \quad \quad n = 1 \end{aligned}$$

6 and wherein i is the node to be smoothed, i is
7 connected to N elements, P_i' is the new position of
8 node i, F_n is the variational weight factor for n-th
9 element Ω_n is the positional function for n-th
10 element, C denotes the connectivity pattern of the
11 node, and V indicates the valency of the node.

1 14. The computer program product of claim 11, further
2 comprising instructions for performing an interior
3 angle screening process.

1 15. The computer program product of claim 11, further
2 comprising instructions for constraining the node
3 within a predetermined tolerance.